

AN ORTHOPTEROLOGICAL RECONNOISSANCE OF THE SOUTHWESTERN
UNITED STATES. PART I: ARIZONA.

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During the summer of 1907 Orthopterological field work was carried on by the authors at a number of stations extending from El Paso, Texas, and Albuquerque, New Mexico, to southern and north-central California, the material and notes secured being very extensive and of great value. In this paper we present the results of our work in Arizona, giving first an idea of the environment of the various localities visited.

A trip to the little known Baboquivari range in southern Pima County was interrupted and of necessity abandoned on account of the flooded condition of the country to be traversed. Much good material, however, was taken before our party was compelled to return to Tucson.

Mr. Otho Poling, the well-known Lepidopterist of Quincy, Illinois, accompanied us through southern Arizona and assisted in collecting much of the material, while all secured in northern Arizona was taken by the junior author. The number of specimens examined was nine hundred and seventy-three, while the species numbered sixty-three.

Several specimens collected at Nogales and Grand Canyon by Dr. P. P. Calvert in 1906 and a small series taken in or near the Huachuca Mountains by Mr. H. A. Kaeber in the summer of 1907 have also been studied and inserted in this paper, but these are not included in the count of species and specimens.

The types of all the new forms are in the Hebard Collection.

Tucson, Pima County, Arizona.—Elevation about 2,400 feet. July 23 and 26. The immediate vicinity of Tucson is a nearly level desert plain, extending from the Santa Catalina to the Tucson Mountains, drained by the Santa Cruz River and other less constant and smaller streams and washes. A considerable portion of this plain is covered with stretches of greasewood (*Covillea tridentata*) and scattered growths of various cacti. In the vicinity of the water courses and washes mesquite (*Prosopis* sp.) is the predominating vegetation, attaining a height of twenty feet or more in favorable localities, especially along the Santa Cruz River. The most successful collecting was found in and about a vacant lot on the edge of the city, in the central part of which was a small pool of water, the outlet of a city drain. About

this pool were high cat-tails and other thick growths of plants, in which situation Orthopters were found to be very plentiful, and likewise among a nearby dense thicket of wild sunflowers and bushes. In these situations the following species were taken: *Paratettix toltecus*, *Syrbula fusco-vittata*, *Scyllina calida*, *Encoptolophus texensis*, *Trepidulus rosaceus*, *Conozoa carinata*, *Anconia integra*, *Schistocerca vaga*, *Æoloplus tenuipennis*, *Melanoplus brownii*, *M. atlantis* and *Æcanthus quadripunctatus*. In the irrigated fields near the river some specimens were found, although by no means as many as might have been expected in a locality apparently so favorable. On the typical desert greasewood plain forms peculiar to a like environment, such as *Heliastus aridus*, *Ligurotettix kunzei*, *Derotmemma laticinctum* and *Psoloessa texana*, were taken. In the city at night about the arc lights thousands of Gryllids swarmed and could be easily captured in great numbers.

Sonora Road Canyon, Tucson Mountains, Pima County, Arizona.—Altitude about 3,000 feet. July 25. The old Sonora trail after leaving Tucson winds around the southeast base of the rather low Tucson Mountains, then turns sharply and crosses the range by following up an arroyo or torrent bed and traversing a very low pass in a shallow canyon with sloping sides. The canyon is very rough and much of the rock exposure is dull reddish in color. The vegetation is composed in large part of desert foothill types, the most noticeable of which are numerous sahuaro (*Cereus giganteus*), palo verde (*Cercidium torreyanum*), cholla (*Opuntia* sp.) and the peculiar *Koeberlinia spinosa*. Orthoptera were few in number, but the species found were of very great interest and differed noticeably from those of the surrounding plains. These included a new mantis *Yersinia sophronica*, a new Truxalid *Horesidotes papagensis*, *Ageneotettix australis*, *Aulocara rufum*, *Arphia teporata* and *Phrynotettix magnus*. The majority of the specimens taken showed considerable adaptation of their coloring to the reddish exposures.

Sahuaro Slope, Southwest Side of the Tucson Mountains, Pima County, Arizona.—July 25. After crossing the Tucson range the Sonora trail descends the extensive and gentle southwestern slope of the mountains through a numerous growth of sahuaro or giant cactus (*Cereus giganteus*), with attendant greasewood (*Covillea tridentata*) bushes growing thickly and often to a height of over six feet. Many other plants flourish, the intervening ground between them being usually quite bare, as is often the case in this desert country. On the greasewood in this situation *Ligurotettix* was very plentiful and its faint stridulation was to be heard on every side. Most of the collecting was done at an elevation of about 2,500 feet.

Near Sonora Road, Southwest of the Tucson Mountains, Pima County, Arizona.—July 25. Several miles from the Tucson Mountains collecting was carried on for a short time in a grassy area with occasional bunches of rabbit-weed. In this locality Orthoptera were found to be far more plentiful than on the surrounding more truly desert plain. Among the species taken were *Psoloessa texana*, *Encoptolophus subgracilis*, *Tomonotus aztecus*, *Trepidulus rosaceus*, *Trepidulus melleolus*, *Derotmema laticinctum* and *Hesperotettix festivus*.

Rooble's Ranch, near Coyote Springs, Pima County, Arizona.—July 24 and 25. This locality is in the lower level of a plain stretching from the Tucson to the Comobabi range, near a large arroyo known as Rooble's Wash. It is in a uniform mesquite and rabbit-weed region, with no striking difference in conditions for a number of miles to the northeast. Two specimens of *Trepidulus melleolus* were the most interesting forms taken.

Yuma, Yuma County, Arizona.—Elevation about 150 feet. July 27 and 28. To the east of Yuma the desert stretches, broken by occasional low volcanic hills, where it is too hot for even the greasewood to thrive and desert Orthoptera are almost wholly absent. Along the Colorado River, however, is a wide strip of willows, and back of these ground heavily overgrown with arrow-wood (*Pluchea sericea*) and other reeds where collecting was more productive. These, although so near the river, were nevertheless parched with the heat. To the east along the Gila River a great expanse of high weeds was found, but so dry that many fell to pieces when touched and insect life was extremely scarce. In the irrigated tract below Yuma *Orphulella compta* was very abundant. In the town at night Gryllidæ and thousands of beetles and other insects swarmed around the arc lights. All of these Gryllids flew rapidly about, and would have been difficult to capture had they not come to the light dazed and confused.

Williams, Coconino County, Arizona.—Altitude, 6,748 feet. September 13. The little collecting done here was accomplished near the station in a field of short weeds and grass, and also near the pine "glades" as they may be called. The whole country about Williams is on nearly the same plane but gently rolling. Over this area pines were thickly scattered, underneath which was practically no underbrush but very green grasses, this vegetation imparting to the whole country a park-like appearance. In the vacant field, where the weeds were more abundant than elsewhere, Orthoptera were found more plentiful than we had expected to find them at this elevation.

Anita, Coconino County, Arizona.—Altitude about 6,500 feet. September 11. At this small station, between Williams and the Grand

Canyon, but very little time was allowed for collecting. It is in the midst of the pine "glades," and, no town being located there, the few specimens taken are typical of the park-like country on the top of the Coconino plateau. The country was in general the same as that outside the town of Williams.

Grand Canyon of the Colorado, Coconino County, Arizona. Rim of the Canyon at Bright Angel and Vicinity.—Elevation, 6,800–7,000 feet. September 11. Back from the edge of the canyon the country is rolling and covered with a forest of pines, under which in most places there is practically no vegetation or soil on the sheet of rock forming the top layer of the plateau.

In this country collecting was almost utterly without result, but along the edge of the canyon, and for a short distance back from it, better results were obtained. An area to the southeast of the hotel was also found where there was some low vegetation under the pines and in this situation *Ageneotettix curtippennis* and *Amphitornus nanus* were taken.

The Bright Angel Trail.—Altitudes, 6,866–2,436 feet. September 12. For some distance on this trail the collecting proved to be much as at the edge of the canyon, but farther down at about 5,850 feet the canyon side became more open, a few junipers appeared and the open places were filled with thickets and grasses. It was here (5,800–4,900 feet elevation) that *Melanoplus canonicus* and *Syrbula modesta* were not uncommon, but more or less difficult to capture owing to the extreme steepness of the location. Farther down (elevation 4,350–3,900 feet) in the grassy valley above the Indian Garden Spring, it was surprising to note that, in spite of the difference of three thousand feet in elevation and the more grassy country, practically the same forms as those occurring at the top of the canyon were found. In the garden of the Indian Spring House one *Paratettix toltecus* was taken. Diligent search failed to disclose more than two specimens of Orthoptera on the wide canyon mesa (3,700–3,800 feet) which was covered with a sage and occasional patches of prickly pear. The *Trimerotropis vinculata* was among sage, while the *Paropomala perpallida* was captured on the very brink of the canyon precipice (elevation 3,750 feet) in a scant bunch of a sort of wire-grass.

BLATTIDÆ.

PERIPLANETA Burmeister.

Periplaneta americana (Linnaeus).

A female of this species was taken at Tucson, July 23, and a male at Yuma, July 27, attracted to light in both cases.

This widely distributed species has previously been recorded from Arizona at Yuma, Nogales, Florence and Phoenix.

HOMŒOGAMIA Burmeister.

Homœogamia erratica Rehn.

A single male of this species was attracted to light at Yuma, July 27.

MANTIDÆ

YERSINIA Saussure.

Yersinia sophronica¹ n. sp.

Type: ♀; Sonora Road Canyon, Tucson Mountains, Pima County, Arizona, altitude 3,000 feet. July 25, 1907. Collected by Hebard and Rehn.

This very peculiar species differs from *Y. solitaria* Scudder from the eastern slope and foothills of the Rocky Mountains, western Nebraska and southeastern Arizona in the smaller size, the more compressed head with strongly acute mammiform eyes which are hardly at all divergent and in the shorter cephalic limbs. In the form of the head and eyes this species suggests the structure found in the African and Indian genera *Episcopus* and *Parepiscopus*.

Size small; form very slender; surface smooth. Head strongly compressed; occiput strongly concave, rounded; interantennal region with a pair of median parallel longitudinal carinæ which terminate dorsad in short sharp points before reaching the dorsal line of the head; antennæ filiform, not quite equal to the pronotum in length; eyes very elongate, not divergent, subparallel, strongly produced mammiform. Pronotum rather short, subequal in width without any marked supra-coxal dilation, the width contained nearly three times in the length; cephalic margin rounded, caudal margin truncate; median carina distinct throughout, but very delicate on the collar. Mesonotum and metanotum little expanded, with distinct median carina, no vestiges of tegmina or wings. Abdomen subfusiform, a finely marked median carina present throughout its length, distal third quite narrow; supra-anal plate trigonal; subgenital plate rounded with a median incision dividing it into

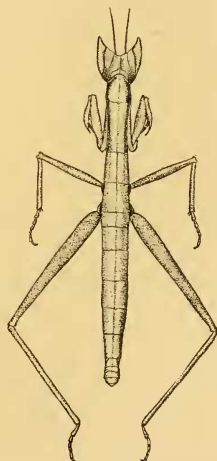


Fig. 1.—*Yersinia sophronica* n. sp. Dorsal view of type. (× 5.)

¹ Σωφρόνη, discreet.

two lobes; cerci damaged. Cephalic coxæ about two-thirds the length of the pronotum and not extending caudad of the same; cephalic femora slightly longer than the coxæ, quite robust, external margin armed with six short irregularly placed spines, internal margin with

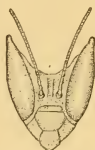


Fig. 2.—*Yersinia sophronica* n. sp.
Front view of head. (× 10.)

eleven spines, the majority of alternating sizes, largest discoidal spines quite robust; cephalic tibiae very slightly less than half the length of the femora, armed on the external margin with eight spines, internal margin with about seven spines, terminal claw large; cephalic metatarsi about as long as the tibiae, slender, remaining tarsal joints about equal to the metatarsi in length. Median limbs rather short, femora very slightly expanded proximad. Caudal limbs moderately slender; femora reaching to the apex of the fifth abdominal segment, distinctly but slightly inflated in the proximal two-thirds; tibiae equal to the femora in length, very slender; caudal tarsi short.

General color cinnamon-rufous, darkened on the dorsum of the head and the median area of the pronotum; median line of the abdomen vandyke brown. Face burnt umber except antennæ and mouth parts which are pale ochraceous. Apex of abdomen washed with broccoli brown, the tips of the terminal plates ochraceous. Limbs ochraceous, tending to ochraceous-rufous on the median and caudal femora and dorsal edge of cephalic femora.

Measurements.

Length of body,	14 mm.
Length of pronotum,	3.2 "
Length of cephalic femur,	2.6 "
Length of caudal femur,	5.7 "

The unique type was found running actively about among the stones of a bare hillside.

LITANEUTRIA Saussure.

Litaneutria skinneri Rehn.

A male specimen from the Grand Canyon, altitude 7,000 feet, September 11, 1907, belongs to this species, while another male, not quite mature, from Tucson, July 26, is referred to it with some little doubt. The Grand Canyon male has the tegmina slightly shorter than the typical individuals of that sex, while the blackish tegminal maculation of the type is absent.

PSEUDOSERMYLE Caudell.

Pseudosermyle truncata Caudell.

Two male specimens of this species taken at Palmerlee, Huachuca Mountains, Cochise County, July 9 and 16, by Mr. H. Kaeber have been examined. The species is now known to range from the Grand Canyon region south at least to the southern boundary of the Territory and west to southern California. The localities from which it has been recorded are Dos Cabezos, Bright Angel, San Bernardino Ranch and the Huachuca and Santa Rita Mountains.

ACRIDIDÆ.**PARATETTIX** Bolivar.

Paratettix toltecus (Saussure).

At Tucson two females of this species were taken on July 26, and a single female was collected by Hebard at 3876 feet elevation on the Bright Angel Trail, Grand Canyon, September 12. These individuals were taken on damp ground near water. All three specimens have the apex of the pronotum failing to reach the tips of the caudal femora.

MERMIRIA Stål.

Mermiria texana Bruner.

A female specimen of this species taken at Palmerlee, Huachuca Mountains, Cochise County, July 6, by Mr. H. Kaeber has been examined.

PAROPOMALA Scudder.

Paropomala acris n. sp.

Type: ♂ ; Railroad Pass, Cochise County, Arizona, altitude 4,386 feet. July 23, 1907. (Hebard and Rehn.)

This species differs from the previously known species of the genus in the following particulars: from *cylindrica* and *calamus* in the much shorter subgenital plate and longer tegmina; from *pallida* in the slenderer form and more acute fastigium; from *dissimilis* and *virgata* in the more produced head, the more acute fastigium and the more elliptical eyes.

Size rather small; form elongate, very slender. Head with the dorsum slightly longer than the dorsum of the pronotum, occiput hardly elevated, very slightly arched, fastigium and interocular region horizontal; interocular region slightly narrower than the greatest width of the fastigium; fastigium longer than broad, distinctly acute-angulate in shape with the immediate apex well rounded, surface of the fastigium with a circular impression covering about two-thirds the circumference of a circle; eye elongate-ovate; angle of face considerably retreating, the interantennal region with the angle less acute and

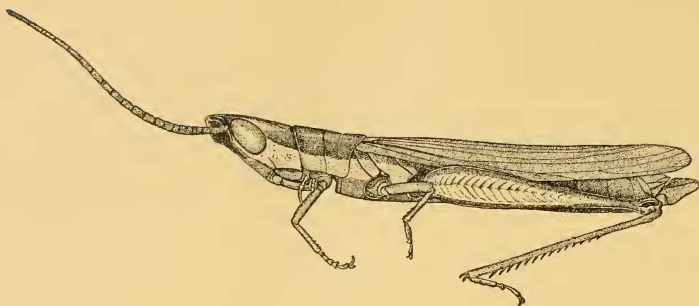


Fig. 3.—*Paropomala acris* n. sp. Lateral view of type. ($\times 4$.)

joining the fastigium in a distinctly but not greatly acute angle, frontal costa narrow, gradually and slightly but rather irregularly expanding caudad, strongly sulcate from the fastigial angle to the clypeus; lateral foveolæ broad linear, slightly arcuate, distinctly impressed; antennæ exceeding the head and pronotum by about the length of the fastigium, distinctly ensiform, tips very slender. Pronotum very slightly constricted mesad, the caudal width of the disk contained about twice in the length; cephalic margin of the disk irregularly arcuate, caudal margin of the disk regularly arcuate;

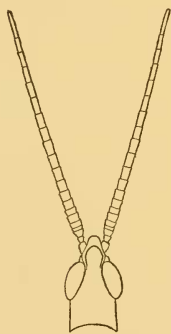


Fig. 4.—*Paropomala acris* n. sp. Dorsal outline of head. ($\times 4$.)

median carina distinct throughout its length, not high; prozona nearly half again as long as the metazona, metazona deeply punctate, lateral lobes distinctly longer than deep, ventral margin nearly straight, cephalic margin straight oblique, metazona of the lateral lobes punctate. Tegmina exceeding the tips of the caudal femora by very slightly more than the length of the fastigium and falling very little short of the tip of the subgenital plate, in shape very narrow with the apex narrowly rounded. Prosternum with a low blunt process. Interspace between the mesosternal lobes very narrow and apparently divided mesad by the lobes which are subcontiguous at that point; metasternal lobes contiguous. Supra-anal plate acute-trigonal, arched transversely, slightly flattened dorsad; cerci simple, styliform, very slightly arcuate ventrad, reaching nearly to the

apex of the supra-anal plate; subgenital plate moderately compressed

acute-angulate in outline when viewed from the side, apex well rounded, the dorsum of the plate with a median longitudinal lamellate carina. Cephalic and median limbs very short. Caudal femora half again as long as the head and pronotum together, compressed, moderately slender; tibiæ very slightly shorter than the femora, armed on the external margin with fourteen spines.

General color dorsad and ventrad salmon, a chalk-white bar on each side extending from the caudal and ventral margin of the eye over the entire genæ, ventral half of the lateral lobes of the pronotum, pleura and lateral face of the caudal femora. This white bar is bordered dorsad by one of chocolate which is very narrow at the eye but gradually expands to the middle of the pronotum, whence it as gradually contracts until it is lost dorsad of the articulation of the caudal limbs. Another narrow whitish line is present on each side of the head and prozona between the chocolate bar and the general color and a pair of lunate bars of vinaceous-rufous are present on the occiput. Eyes tawny olive; antennæ and face raw umber. Tegmina buff, humeral vein seal brown.

Measurements.

Length of body,	21 mm.
Length of pronotum,	3 "
Length of tegmen,	14 "
Length of caudal femur,	9.8 "

The type is the only specimen of the species examined and was taken on the desert summit of the Pass, among mesquite bushes and dry grass.

Paropomala perpallida n. sp.

Type: ♂; near Bright Angel Trail, elevation 3,750 feet, Grand Canyon of the Colorado, Coconino County, Arizona. September 12, 1907. Collected by M. Hebard.

This species is closely related to *P. pallida* Bruner from the Salton Basin, California and southwestern Arizona, differing in the considerably smaller size.

Size small; form moderately slender (for the genus). Head very slightly longer than the dorsum of the pronotum; occiput and interocular region regularly but not strongly arcuate from the pronotum to about the middle of the fastigium; interocular region very slightly narrower than the greatest fastigial width; fastigium slightly longer than broad, lateral margins acute-angulate but with the apex very broadly rounded, impressed pattern on the disk of the fastigium semicircular; face very considerably retreating, interantennal region with the angle much less acute and very narrowly rounding into the fastigium, frontal costa subequal in width to below the median ocellus whence it

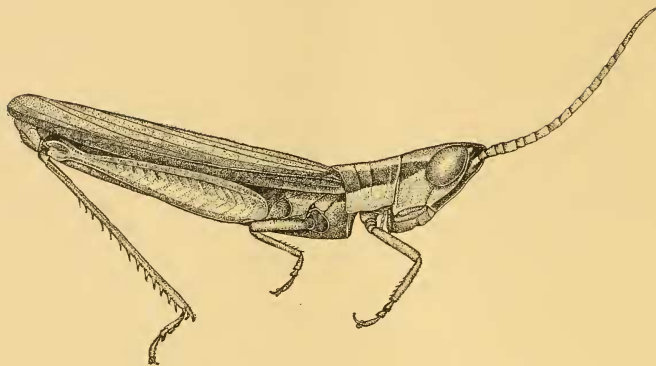


Fig. 5.—*Paropomala perpallida* n. sp. Lateral view of type. ($\times 5$.)

regularly but not greatly expands to the clypeal suture, sulcate throughout its length; eyes narrow-ovate, moderately prominent when viewed from the dorsum; lateral foveolæ sublanceolate, slightly arcuate, deeply impressed; antennæ about three times the length of the pronotum, slightly depressed and expanded proximad, tips very slender. Pronotum with the caudal width of the disk contained slightly less than twice in the length of the disk; cephalic margin of the disk subtruncate,



Fig. 6.—*Paropomala perpallida* n. sp. Dorsal outline of head. ($\times 5$.)

caudal margin arcuate with the median portion somewhat flattened; median carina distinct but low, prozona slightly more than half again the length of the metazona, the latter on the dorsum and lateral lobes thickly but shallowly punctate; lateral lobes slightly longer than deep, ventral and cephalic margins obliquely sublinear. Tegmina reaching to the apex of the subgenital plate, narrow, apex truncatorotundate. Mesosternal lobes separated by a very narrow space; metasternal lobes attingent. Subgenital plate slightly compressed, apex very slightly rostrate. Cephalic and median limbs very short. Caudal femora failing to reach the tips of the tegmina by more than half the length of the pronotum, moderately slender, compressed; caudal tibiæ slightly shorter than the femora, external margin armed with thirteen spines.

General color cream-buff with a barely appreciable greenish tinge. Dark lateral bars vandyke brown, gradually expanding

on the head, continued over the lateral lobes and pleura, suffusing the base of the costal field of the tegmina and coloring the proximal half of the discoidal and humeral veins of the same and the dorsal half of the proximal abdominal segments. White lateral bars as in *P. acris*, but not present on the caudal femora. Eyes clay color marbled with bistre; face and mouth parts sprinkled with small spots of brown; antennæ tawny, darker proximad. Caudal femora of the general color with the dorsal half of the lateral face pale vinaceous bordered ventrad by a line of dots of brownish.

Measurements.

Length of body,	16.2 mm.
Length of pronotum,	2.5 "
Length of tegmen,	11 "
Length of caudal femur,	8 "

The type specimen is the only one examined by the authors. It was taken on the extreme edge of the canyon plateau and was found clinging to a wisp of dry grass, the only vegetation along the extreme edge of the plateau above the trail.

SYRBULA Stål.

Syrbula fuscovittata Thomas.

At Tucson on July 26 two males and three females of this species were taken from high weeds growing in damp soil surrounding a pool. An immature female was also taken in Sonora Road Canyon, Tucson Mountains, July 25.

One of the males is in a condition similar to that of the specimen of the same sex recorded by Rehn.² Two of the females are in the green phase and the other in the brown phase, with, however, much very pale green on the face and sides of the head, lateral lobes of the pronotum, tegmina and caudal femora. The males are smaller than the average of a series of eight from the Huachuca Mountains.

Syrbula modesta Bruner.

This rather diminutive species was taken at elevations ranging from 4,900 to 5,800 feet in the Grand Canyon, three males and two females being included in the series. Apparently this species has two color phases, as all the specimens seen are in a brown phase of coloration, while Bruner's original description shows that his specimens had green or greenish the predominating color.

As far as known this species is found only in the Grand Canyon region. The males of this form, instead of flying straight from one place to another, rise usually very swiftly in a curve which, on account of their size and coloration, makes them very hard to follow. The females rely almost altogether on their powerful saltatorial ability. Often in alighting the males would select the terminal twigs of a juniper as resting places. In distribution it appeared to be very local.

BOÖTETIX Bruner.

Boötetix argentatus Bruner.

This very interesting species was taken at several localities and always on its favorite shrub, the greasewood (*Covillea tridentata*). At Yuma on July 27 it was found to be numerous and seven males were taken; an immature individual was collected at Sentinel, July 27. An adult male and an immature specimen were taken on the Sahuaro slope southwest of the Tucson Mountains, July 25.

All the specimens collected lack decided spots on the sutural margin of the tegmina, and even traces are present in only one individual.

AMPHITORNUS McNeill.

Amphitornus nanus n. sp.

Type: ♂; Grand Canyon of the Colorado, Coconino County, Arizona, altitude 7,000 feet, in conifer forest. September 11, 1907. Collected by Morgan Hebard.

Closely related to *A. ornatus* McNeill, but differing in the very small size (length of body 14.5 mm.) and the shorter tegmina which hardly surpass the tips of the caudal femora.

Size quite small; form as usual in the genus. Head very slightly shorter than the dorsum of the pronotum, occiput and interocular region regularly but slightly ascending to the fastigium; interocular region but little narrower than the greatest fastigial width; fastigium slightly acute-angulate, the immediate apex narrowly rounded, median carina distinct on occiput, interocular region and fastigium, very low except on the fastigium; face considerably retreating, inter-antennal region rounding to the subrectangulate junction with the fastigium; frontal costa moderately broad and subequal to a very short distance ventrad of the ocellus, considerably broader and subequal thence to the clypeal suture, for its entire length depressed within its margins and punctate; eyes subacute-ovate, hardly prominent when viewed from the dorsum; lateral foveolæ distinct, impressed caudad; antennæ about equal to the head and pronotum in length, rather robust, slightly depressed proximad, tips bluntly acuminate. Pro-

notum with the disk about half again as long as the greatest caudal width of the same; cephalic margin of the disk subtruncate, caudal margin very obtuse-angulate; median carina moderately elevated, accessory carinae distinct and parallel with but weaker than the median one; lateral lobes slightly longer than deep. Tegmina exceeding the abdomen by slightly less than the length of the eye and very slightly surpassing the tips of the caudal femora; apices of tegmina rounded; intercalary vein absent. Interspace between the mesosternal lobes subquadrate, but little narrower than one of the lobes; metasternal lobes subattingent caudad. Subgenital plate blunt, somewhat compressed dorsad. Caudal femora slightly more than three times the length of the pronotum, of medium build; caudal tibiae considerably

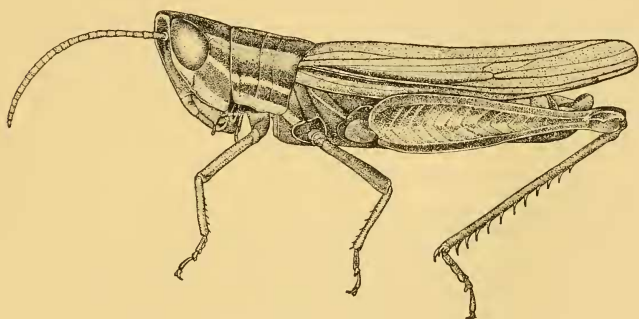


Fig. 7.—*Amphilornus nanus* n. sp. Lateral view of type. ($\times 5$.)

shorter than the femora, armed on the lateral margin with eleven to twelve spines.

General colors vandyke brown, seal brown and pinkish white. A narrow line of white extends from the caudal margin of the eye obliquely ventro-caudad to the pronotal margin, thence transversely across the lateral lobe, curving somewhat ventrad at the caudal margin. Another whitish line extends from the base of each antenna as a narrow line bordering the ventro-cephalic and ventral border of the eye, broadening and extending diagonally across the gena to the ventro-caudal angle of the same, reappearing again as a moderately wide white ventral border to the lateral lobe, separated from the one dorsad of it by a wider bar of seal brown, and vanishing dorsad of the insertion of the median limbs. Head with the dorsal surface, sides and face seal brown, aside from the white bars mentioned above and a bar of

mars brown extending from the dorso-caudal margin of the eye to the caudal margin of the pronotum, margining the disk on the latter; eyes and antennæ walnut brown. Pronotum with the disk seal brown, except for the area between the supplementary carinæ which is chocolate.³ Tegmina vandyke brown, seal brown proximad in the region of the humeral and discoidal veins; area between the mediastine and humeral veins proximad with a bar of whitish. Venter and abdomen Naples yellow, stippled on the sides and apex of the abdomen with brownish. Cephalic and median limbs thickly sprinkled with walnut brown on a paler ground. Caudal femora with the dorsal half with ecru drab as a base color, ventral half straw yellow, genicular region seal brown, bar at a third the length from the tips seal brown, distinct and solid dorsad, weak ventrad; dorsal face with the proximal half washed with seal brown and the dorsal half of the lateral face clouded with one extensive proximal maculation and a smaller median one. Caudal tibiæ glaucous blue, blackish at the genicular region and pale between this and the glaucous portion, spines with their distal halves black.

Measurements.

Length of body,	14.5 mm.
Length of pronotum,	2.7 "
Length of tegmen,	11.5 "
Length of caudal femur,	8.7 "

The unique type was found on ground devoid of vegetation but covered with needles in the dense piñon and juniper forest. No other Orthoptera were noticed in this locality.

ORPHULELLA Giglio-Tos.

Orphulella compta Scudder.

This species was exceedingly abundant at Yuma, on irrigated ground along the Colorado River south of the town. On July 28 a series of twenty-six males, sixteen females and two nymphs was taken.

Of this series about half is in the green phase, while the remainder is divided between a full brown phase and one possessing both green and brown in its make-up—a mixed phase. Only one, a female, shows any tendency toward purplish on the tegmina, and in this case it is not strongly marked. There is a considerable amount of variation in size in both sexes, and also in the form of the angle and depth and extent of the excavation of the fastigium.

³ This bar is very faintly indicated on the head.

The records of this species show its main range to be over the lower part of the Colorado Valley and adjacent Salton Basin, while the occurrence of it at San Bernardino Ranch, Cochise County, in southeastern Arizona, in all probability, is due to the species following up the Yaqui Valley from the Gulf of California section of Mexico.

HORESIDOTES Scudder.

Horesidotes papagensis n. sp.

Type: ♀; Sonora Road Canyon, Tucson Mountains, Pima County, Arizona, altitude about 3,000 feet. July 25, 1907. Hebard and Rehn.

Closely allied to *H. cinereus* Scudder, with topotypes of which it has been compared, but differing in the somewhat smaller size, blunter fastigium, greater interspace between the eyes, less apparent lateral foveolæ, quite distinct and continuous intercalary vein and more

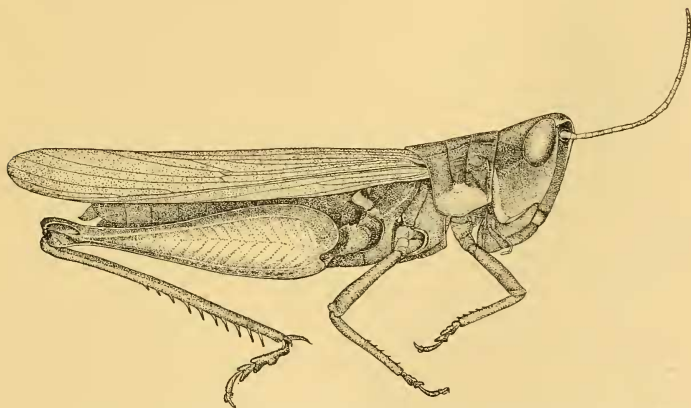


Fig. 8.—*Horesidotes papagensis* n. sp. Lateral view of type. ($\times 4$.)

robust and inflated and proportionately somewhat shorter caudal femora.

Size moderate; form distinctly compressed. Head slightly shorter than the dorsal length of the pronotum, ascending on the occiput to the vertex which is interocular, fastigium well rounded into the facial outline; interocular region subequal to the width of the fastigium, the occiput and interocular region with a weak median and pair of closely placed supplementary carinæ; fastigium slightly broader than long,

slightly acute-angulate with the apex blunt, surface but slightly depressed in the form of a crescent; lateral foveolæ entirely visible from the dorsum, sublinear, slightly arcuate, not deeply impressed; face moderately retreating; frontal costa regularly expanding ventrad, sulcate and impressed for a distance ventrad of the ocellus, punctate dorsad; eyes somewhat acute-ovate, not very prominent when viewed from the dorsum; antennæ about as long as the head and pronotum, depressed and slightly expanded proximad. Pronotum somewhat

constricted mesad; cephalic margin of disk slightly arcuate, caudal margin obtuse-angulate; median carina distinct and well elevated, severed by the transverse sulcus slightly caudad of the middle, lateral carinæ slightly less elevated than the median, arcuate convergent on the cephalic third of the disk, at a third the length from the cephalic margin they are separated by a space but little more than half that separating them at the cephalic margin, from which point of greatest proximity they diverge in straight line to the caudal margin where they are slightly more distant than cephalad; lateral lobes as deep as long, ventral margin obtuse-angulate. Tegmina exceeding the apex of the abdomen by about the dorsal length of the head, narrow, tips rounded; intercalary vein distinct and continuous, at least distad; lobe on the costal margin small. Interspace between the mesosternal lobes subquadrate, narrower than the width of one of the lobes; metasternal lobes

Fig. 9. — *Horesidotes papagensis* n. sp.
Dorsal view of head
and pronotum.
($\times 4$.)



subcontiguous caudad. Cephalic and median limbs of medium build. Caudal femora three times the length of the pronotum, rather robust; caudal tibiæ slightly shorter than the femora, armed on the external margin with ten spines, internal spurs subequal.

General dorsal color prout's brown, obscurely sprinkled and mottled with vandyke brown; general ventral color ochraceous-buff becoming very pale yellowish on the abdomen. Head with the face and ventral half of genæ ochraceous-buff sprinkled with vandyke brown, mouth-parts rufous; eyes clay color mottled with vandyke brown; antennæ rufous becoming olive-buff distad. Pronotum with the disk slightly paler than the dorsal half of the lateral lobes, line between dorsal and ventral color slightly below the middle of the lateral lobes, sinuate, sharply defined; an isolated bar of the ventral color is present dorsad

of the insertion of the caudal limbs. Tegmina of the dorsal color. Cephalic and median limbs tawny, obscurely and imperfectly annulate and marbled with darker. Caudal femora vinaceous-cinnamon, marbled and washed with vandyke brown; caudal tibiae very pale glaucous, becoming ochraceous proximad, entirely overlaid with fine purplish-red mottlings, spines and spurs with their apical halves black.

Measurements.

Length of body,	21.2 mm.
Length of pronotum,	4 "
Length of tegmen,	17.6 "
Length of caudal femur,	12.7 "

The male specimen from Yuma County, Arizona, recorded by the senior author⁴ as *Horesidotes cinereus*? is seen on re-examination and comparison with the recently acquired material to be nearer *papagensis*, to which we tentatively refer it.

The type of *papagensis* was taken among leaves under bushes on the canyon bottom, and showed no inclination to leave the ground.

SCYLLINA Stål.

Scyllina calida Bruner.

One female specimen of this species was taken at Tucson, July 26, in short grass growing about the end of a drain. Its movements were quite awkward.

The previous records of this species in the United States are from San Bernardino Ranch, Cochise County, and Baboquivari Mountains, Pima County, Arizona.

PSOLOESSA Seudder.

Psoloessa texana Seudder.

The series of specimens of the genus *Psoloessa* taken in Arizona in the summer of 1907 numbers one hundred and six. After considerable study of this and other material, the authors are under the necessity of considering the four nominal species of this genus (*texana*, *ferruginea*, *maculipennis* and *buddiana*) as one, for which they select the name *texana* as it has page priority over *ferruginea* and *maculipennis*, *buddiana* being of much later date.

To some this may appear unwarranted as characters, such as the angle of the face, proportions of the lateral foveolæ of the head and the width of the fastigium, as well as the color pattern, have been used in

⁴ *Proc. Acad. Nat. Sci. Phila.*, 1904, p. 563.

keys to separate the "species." To present the reasons for creating the synonymy clearly, it would be best to explain the methods used in reaching the conclusions. The original descriptions of *ferruginea*, *maculipennis*, *texana* and *buddiana* were tabulated in parallel columns, and from the mass of material specimens which agreed as nearly as possible with these descriptions were selected. The condensed diagnostic characters of the four "species" are as follows:

Typical *buddiana*. Whole dorsum uniform pale pinkish brown. Lateral bars solid and well marked. Caudal femora with but a faint indication of the dorsal bar at the terminal third.

Typical *ferruginea*. Whole dorsum ochraceous with the usual markings on the dorsum of the metazona. Lateral bars broken. Caudal femora with distinct bar at the terminal third.

Typical *maculipennis*. Dorsum of the closed tegmina and pronotum sprinkled with blackish quadrate or subquadrate spots. Lateral bar with the remains less sharply defined than in *ferruginea*.

Typical *texana*. Dorsum suffused with blackish. Tegmina blackish with the veins dark. Caudal femora with the dorsum of the genicular portion black.

The number of specimens of the total of one hundred and six which appeared to be typical of these forms were: *buddiana*, three; *ferruginea*, ten; *maculipennis*, nine; *texana*, three, while eighty-one or over seventy-five per cent. were typical of none. Of this remaining series twelve share characters of *buddiana*, *ferruginea* and *maculipennis*, sixty-six characters of *ferruginea* and *maculipennis* and three characters of *maculipennis* and *texana*.

When compared with three Shovel Mount, Texas, females the Arizona females differ uniformly in the narrower fastigium, which is usually more deeply excavated or at least appears to be so. When the Arizona series of both sexes is examined there is seen to be considerable variation in both sexes in the width of the fastigium, irrespective of locality or color phase, and in the degree of constriction of the lateral carinae of the pronotum. Careful examination of the selected typical females fails to show any difference in the facial angle, and the shape of the lateral foveolæ is of such variability that no reliance can be placed on this character. The long type of foveolæ, supposed to be peculiar to the *texana* form, can be duplicated in specimens picked haphazard from the series of the other three types, and moreover the dark *texana* has as much variability in the few specimens available of the form as one needs to convince them of the variability of this character.

From this evidence there appears but one conclusion to be drawn, and that is to consider the different types forms of one species, as the presence of a seventy-five per cent. intermediate series leaves open to us only this solution or the most arbitrary allotment of this "mixed" body. The latter course has nothing in its favor, as the definition of the "species" would be a practical impossibility.

The localities represented in the series at hand are Tucson, July 26, four ♂, twelve ♀; Sonora Road Canyon, Tucson Mountains, July 25, one ♀; near Sonora Road, southwest of Tucson Mountains, July 25, seven ♂, five ♀; Rooble's Ranch near Coyote Springs, July 24 and 25, twenty-eight ♂, forty-eight ♀. Typical *buddiana* was taken at Tucson, near Sonora Road and Rooble's Ranch, *ferruginea* at Tucson and Rooble's Ranch, *maculipennis* at Tucson and Rooble's Ranch and *texana* at Tucson and near Sonora Road.

This insect appears to be the most difficult to capture of almost any of the desert species encountered, this being due to its remarkable protective coloration and to its great swiftness in springing into the air and taking flight. It was by all odds the most plentiful and widely distributed desert species collected.

AGENEOTETTIX McNeill.

Ageneotettix australis Bruner.

An adult male of this species was taken in Sonora Road Canyon, July 25, and an immature female at Rooble's Ranch, the same date. The mature specimen was captured on the rocky canyon side.

Ageneotettix curtippennis Bruner.

A female specimen from Bright Angel, altitude 7,000 feet, September 11, is referred to this species. The tegmina are very short, not more than one-third the length of the abdomen, and the caudal tibiae have the proximal third ochraceous clouded and sprinkled with fuscous. The original locality for this species was simply "Southern Colorado," and in consequence this is the first definite record for the species.

The specimen was found on stony ground, among low plants in a forest of piñon and juniper, where *Amphitornus nanus* was the only other species of Orthoptera seen.

AULOCARA Scudder.

Aulocara rufum Scudder.

A single male of this species was taken in Sonora Road Canyon, Tucson Mountains, July 25.

LIGUROTETTIX McNeill.**Ligurotettix kunzei** Caudell.

This extremely interesting and peculiar species is represented by a series of forty-five specimens taken at Tucson, July 26 (three ♂, two ♀), Sonora Road near Tucson Mountains, July 25 (twelve ♂, five adult ♀, one immature ♀), Rooble's Ranch, July 24 and 25 (eight ♂, one adult ♀, one immature ♀), Sentinel, Maricopa County, July 27 (one ♂), and Yuma, July 27 (three ♂, eight ♀).

The Yuma specimens are as large as Tucson individuals and do not seem to approach the smaller Californian *L. coquillettii*. In size the whole series is fairly uniform, some slight individual variation being noticed in both sexes. Average specimens from the localities represented in the collection measure as follows:

♂			
	Length of body.	Length of tegmina.	Length of caudal femora.
Tucson,	18 mm.	16.8 mm.	9.7 mm.
Near Sonora Road, . . .	16.4 "	15.2 "	9 "
Rooble's Ranch,	16.5 "	16.1 "	9 "
Sentinel,	16 "	15.2 "	9.5 "
Yuma,	17.5 "	16.7 "	10.2 "
♀			
Tucson,	24.2 mm.	22.4 mm.	12.5 mm.
Near Sonora Road, . . .	23.5 "	21.7 "	12 "
Rooble's Ranch,	22 "	20.8 "	11.7 "
Yuma,	24.5 "	22 "	12.8 "

In color there is a considerable amount of variation, all, however, in conformity with the subdued color pattern of the insect. The most peculiar variation is in the presence of blackish brown on the cephalic half or more of the lateral lobes of the pronotum, and also on the pleura accompanied by a suffusion of the genæ. In its complete form this phase is present in but one female from Yuma, in which the contrast with the pale dorsum and caudal portion of the lateral lobes is very striking, although suggested more or less strongly by a few, chiefly males, from Tucson, Sonora Road and Rooble's Ranch. There is a considerable amount of variation in the sprinkling and lining of the dorsum of the pronotum and head and the tegmina with blackish brown, this being, however, more noticeable in the females than in the males. The Yuma specimens as a series and the Sentinel individual are paler and more ashy than those from the vicinity of Tucson and the Papago

country, which may possibly be due to the increased aridity and greater sunlight of southwestern Arizona when compared with the Tucson region. The usual position of specimens on the main branches of *Covillea* would allow reflected light to play a very important part in color bleaching.

At Roeble's Ranch and along the Sonora Road this species was found chiefly on mesquite, where the insects clung tightly to the twigs and trusted so far to their protective coloration that those taken were cautiously approached with the hands and suddenly seized. If not captured they sprang with agility to some other part of the bush and often escaped completely. They stridulated frequently, a faint sikk, sikk, sikk-sikk-sikk. At Yuma the species was found on greasewood (*Covillea*) and was extremely active and wary in spite of the frightful heat.

ARPHIA Stål.

Arphia teporata Seudder.

Three males and a female taken on rocky desert hillside in Sonora Road Canyon, Tucson Mountains, July 25, belong to this species. They are more thickly speckled and variegated with dark brown than a series from Alamogordo, New Mexico, and all are faintly washed with reddish brown.

ENCOPTOLOPHUS Seudder.

Encoptolophus texensis Bruner.

At Tucson along the Santa Cruz River on irrigated land this species was found July 26 in moderate numbers. Eight males and six females were taken, three of the females being in a green phase of coloration, as previously noted in a *Phœnix* specimen,⁵ the green being on the head, pronotum, dorsal face of caudal femora and to a certain extent on the pleura, while another of the same sex is weakly greenish on the same areas. The series exhibits an appreciable amount of variation in size, particularly in the male sex.

Encoptolophus subgracilis Caudell.

A single female with rather short tegmina and wings, taken July 25 in mesquite and rabbit-weed surroundings near the Sonora Road southwest of the Tucson Mountains, is apparently referable to this species. The wings, however, are faintly yellowish proximad, in this respect resembling *texensis*. The measurements of this specimen are as follows:

⁵ *Proc. Acad. Nat. Sci. Phila.*, 1907, p. 76.

Length of body,	22.7 mm.
Length of pronotum,	4 "
Length of tegmen,	18.3 "
Length of caudal femur,	11 "

HIPPISCUS Saussure.**Hippiscus corallipes** (Haldeman).

A single female of this species, taken at the east base of the Huachuca Mountains, July 6, by H. A. Kaeber, has been examined. The species has previously been recorded from that range by the senior author.⁶

DISSOSTEIRA Scudder.**Dissosteira carolina** (Linnaeus).

Three males and two females of this widely distributed species were taken at Williams, September 13, while a single female was taken September 11 at Bright Angel, Grand Canyon, elevation of 6,850 feet.

TOMONOTUS Saussure.**Tomonotus ferruginosus** Bruner.

A pair of this species from Palmerlee, Huachuca Mountains, Cochise County, Arizona, taken July 5 and 15 by H. Kaeber, has been examined. The range of this form includes localities from Southern California to Fort Grant and the Huachuca Mountains, southeastern Arizona, and from Phoenix, Arizona, to Uruapan, Michoacan, Mexico.

Tomonotus aztecus (Saussure).

A series of seven males and two females of this species were taken July 25 near the Sonora Road, southwest of the Tucson Mountains, on a flat covered with very low weeds with many bare spaces between. A single male was also taken the same day at Rooble's Ranch.

METATOR McNeill.**Metator pardalinum** (Saussure).

A single female of this species, taken at Williams, September 13, is the first Arizona record of the genus and species. The specimen has the disk of the wings scarlet and is inseparable from Colorado individuals. It was taken in an open place thickly overgrown with rabbit-weed and other equally low vegetation.

MESTOBREGMA Scudder.**Mestobregma obliterated** Bruner.

A series of six males and ten females was taken at Williams, September 13. There is considerable variation in the length of the tegmina

⁶ *Proc. Acad. Nat. Sci. Phila.*, 1907, p. 36.

and wings in the females, while the same is true of the caudal femora. The disk of the wings is lemon yellow in all the specimens and the transverse bar is not distinctly marked. The caudal margin of the disk and lateral lobes of the pronotum are distinctly colored with yellowish in a few specimens, while the angle of the tegmina is lined with the same in three specimens and with whitish in two others.

This species was found in the same situation as *Metator pardalinum*.

TREPIDULUS McNeill.

Trepidulus rosaceus (Scudder).

This very interesting species is represented by a series of twenty-nine males and twelve females. The localities at which it was taken are Tucson, July 26 (10 ♂, 9 ♀); near Sonora Road, July 25 (15 ♂, 2 ♀); Rooble's Ranch, July 25 (3 ♂, 2 ♀), and Yuma, July 28 (1 ♂). In size the series exhibits an appreciable amount of variation, while the coloration shows all conditions of ashy washes and blackish speckling and blotching, particularly on the dorsal aspect of the closed tegmina, while the base color ranges in spots from ochre to seal brown. The pale ventral portion of the lateral lobes of the pronotum is, however, sharply defined in every individual, and the two dorsal blotches on the caudal femora are distinct in all but one female specimen. Attention should be called to the fact that the Yuma individual is uniformly more grayish than specimens from the Tucson region, the maculations being sub-obsolete.

This species was found in the same restricted locality along the Sonora Road as *Tomonotus aztecus* and *Trepidulus melleolus*, where it was moderately plentiful; at Yuma the single specimen encountered was taken on a broad flat of high weeds which had been completely dried by the extreme heat. It was found common among desert growth at Tucson, on the outskirts of the Mexican section of the town.

Trepidulus melleolus (Scudder).

Two males from the vicinity of the Sonora Road, July 25, and two males and a female from Rooble's Ranch, July 25, represent this interesting species. It appears from the material in hand, five males and two females, that there is a great amount of individual variation in size in both sexes; the two females before us, one from Rooble's Ranch, the other from San Bernardino Ranch, Cochise County, having a considerable difference in size. The coloration is fairly constant in character.

This species enjoys a range from northeastern New Mexico (La Trementina) to Pima County, Arizona.

This striking form was taken on the desert plain in the two above localities where it was extremely scarce.

DEROTMEMA Scudder.

Derotmema laticinctum Scudder.

On the desert plains of the Papago country this species was collected in numbers, a series of seventy-one males and thirty-three females being before us. It was usually found on exposed areas of adobe soil and associated with *Psoloessa texana*. The series is distributed as follows: Tucson, July 26, twenty-seven males, eleven females (one immature); Sahuaro slope, southwestern side of Tucson Mountains, July 24, one male; near Sonora Road, southwest of Tucson Mountains, July 25, eighteen males, fifteen females (two immature); Roeble's Ranch, July 24 and 25, twenty-five males (one immature), seven females (two immature).

This series is quite variable in the depth of coloration and in the character of the maculations on the anal area of the tegmina. Some specimens have three or four comparatively large blotches on this portion of the tegmina, while others have the same region more or less thickly sprinkled with small quadrate blotches. The fuscous bar on the wing varies in intensity and considerably in extent. One specimen from Tucson has the bar very weak and of little extent.

The specimens from the Baboquivari Mountains previously recorded by the senior author as *Derotmema delicatulum*,⁷ prove on second examination and comparison with typical specimens of *delicatulum* to be this species. The range of the species is now known to extend from the west slope of the Organ Mountains of central southern New Mexico to Phoenix, Maricopa County, and the Baboquivari region, Pima County, Arizona.

Derotmema delicatulum Scudder.

This rather remarkable species is represented by four specimens, two of each sex, taken at Sentinel, Maricopa County, July 27. The very prominent eyes, very pale, in fact almost colorless, disk of the wing and much reduced but conspicuous and well-defined transverse blotch on the wing are sufficient to enable one to readily recognize the species. The coloration is very pale, with the darker pattern well defined and comparatively regular.

The habitat of this form is the Mohave and Yuma deserts, ranging from the western edge of the Mohave at Mohave and Lancaster, California, to at least Sentinel, Maricopa County, Arizona. The specimens

⁷ *Proc. Acad. Nat. Sci. Phila.*, 1907, p. 72.

listed above were collected during a train stop in a most arid and desolate location.

***Derotmema haydeni* (Thomas).**

A series of five males and four females was taken at Williams, September 13 (two ♂, two ♀), and Anita, September 11 (two ♂, three ♀). The disk of the wing is red in five specimens and yellow in four, regardless of locality. The series from Williams is more blackish than usual in the species, while the Anita individuals are quite reddish. The species has previously been recorded from Flagstaff.

At Anita the species was common on reddish soil in an open field, while at Williams it was taken in an open place heavily overgrown with low vegetation.

CONOZOA Saussure.

***Conozoa carinata* Rehn.**

A series of five males and one female taken at Tucson, July 26, represent this species. These specimens are somewhat paler than the types, while the males have the fastigium very slightly narrower than in the female type. The female specimen has the metazona of the pronotum abnormally humped, probably as the result of an injury.

This species is now known to range from the Huachuca Mountains to the Baboquivari range, north to Tucson.

***Conozoa sulcifrons* (Scudder).**

At Yuma this species was taken in numbers on July 26 and 27, a series of twenty-one males and twenty-three females being secured. When compared with a series from Grand Junction, Colorado, the Yuma specimens are seen to average considerably larger. The Yuma series is as a whole more warm brown in color, with the dorsal aspect of the head, pronotum and anal field of the tegmina paler and more uniform.

The specimens from Florence and Phoenix, Arizona, referred to *C. acuminata* with a query by the senior author⁸ belong to this species. In size they are slightly smaller than Yuma individuals of the same sex.

This was the most plentiful species found on the dry earth of the river bed and along its banks. Although an active flyer no great difficulty was experienced in capturing specimens.

TRIMEROTROPIS Stål.

***Trimerotropis fascioides* McNeill.**

A single female of this species was collected at light at Nogales, August 13, 1906, by Dr. Calvert.

⁸ *Proc. Acad. Nat. Sci. Phila.*, 1904, p. 567.

The specimens recorded by Snow⁹ from Oak Creek Canyon and Humphreys Peak, Coconino County, Arizona, as this species prove, on examination of individuals forwarded by Prof. Snow, to be *T. alliciens* Seudder. The two forms, however, are very closely related.

***Trimerotropis modesta* Bruner.**

A female of this form taken on the rim of the Grand Canyon, near Bright Angel, September 11, and a male taken at Williams, September 13, are in the collection. The specific validity of this form appears to be rather questionable, as its relationship to *T. citrina* is so close that it may be nothing more than a race of that species.

***Trimerotropis strenua* McNeill.**

Two specimens of this species were taken at Tucson, July 26, at light. When compared with Salt Lake Valley specimens they are seen to be inseparable. Snow has recorded this species from San Bernardino Ranch, Cochise County, Arizona.

***Trimerotropis inconspicua* Bruner.**

Three males of this species taken at Bright Angel, Grand Canyon, 6,880 feet to 7,000 feet, are before us. Two were taken July 29 to August 2, 1906, by Calvert, and one on September 11, 1907, by Hebard. Two specimens are identical in coloration with the tegminal bars decidedly blackish and strongly contrasting with the pale ochraceous base color, while the other specimen is decidedly reddish, both bars and base color.

This species was described by Bruner from material taken at a number of localities in the Grand River region of western Colorado, this being the first record of the species from any locality outside of that State.

The specimen taken on September 11 was the only individual of the species noticed and was captured in the forest of piñon and juniper.

***Trimerotropis vinculata* Seudder.**

This wide ranging species is represented by eighty-three specimens taken as follows: Tucson, July 26, 27 ♂, 18 ♀; Sonora Road Canyon, July 25, 4 ♂; Sonora Road near Tucson Mountains, July 25, 2 ♀; Roebble's Ranch, July 24 and 25, 13 ♂, 4 ♀; Nogales, August 13 (at light, Calvert), 1 ♂; Yuma, July 28, 1 ♂; Williams, September 13, 1 ♂; Bright Angel Trail, Grand Canyon, elevation 3,000–7,000 feet, July 29–August 2 (Calvert), September 11 and 12 (Hebard), 3 ♂, 9 ♀.

The specimens of the series present a considerable amount of varia-

⁹ *Trans. Kansas Acad. Sci.*, XX, pt. 2, p. 37.

tion in size and the usual modifications of width and characters of tegminal bars, as well as differences in the general light base color. As the variability of this species is almost endless, it is hardly necessary to call attention to any types except one which is suffused with ochraceous-rufous, represented by all the Sonora Road Canyon specimens and faintly approached by one from Tucson, and a very dull type, represented by several from Bright Angel rim (7,000 feet) and the single individual from Williams. Other specimens, however, from the rim of the Grand Canyon at Bright Angel are of normal contrast, and one is extremely contrasted with quite pale base color.

***Trimerotropis cyaneipennis* Bruner.**

A series of sixteen males and seven females of this species was taken at elevations ranging from 3,800 to 7,000 feet on and in the vicinity of the Bright Angel Trail, Grand Canyon, September 11 and 12. The majority of the specimens are strongly washed with reddish, the greater portion of these reddish specimens being from elevations not exceeding 5,000 feet, this being evidently due to a protective color modification influenced by the reddish exposure of that portion of the canyon walls. A few individuals possess a more strongly contrasted coloration; the pale color being unsuffused and the bar groups darker. These specimens are from 5,000 and 7,000 feet. On comparing this series with that in the Academy collection I find that specimens from the northern portion of Arizona, south at least as far as Prescott, have the disk of the wings campanula blue in color, while individuals from the ranges of southeastern Arizona (Huachuca, etc.) have the same area glaucous blue. The difference is quite noticeable when the two types are compared. This species makes at will a clatter similar to that of *Circotettix verruculatus*. Especially when alarmed its flight is extremely swift and erratic. It was not plentiful along the canyon edge, but lower on the Bright Angel Trail it was found almost everywhere, most plentiful, however, about bare places near precipices.

CIRCOTETTIX Seudder.

***Circotettix undulatus* (Thomas).**

A series of seven males and nine females taken near the rim of the Grand Canyon at Bright Angel represents this species. Two males and three females were taken July 29 to August 2, 1906, by Calvert, and the remainder September 11, 1907, by Hebard.

The sexes are of practically the same size, and the amount of individual variation of the same character is slight in a series of thirty-six specimens before us. The general color varies from a decidedly blackish type to one distinctly dull reddish brown in general tone.

The previous Arizona records of this species were from Oak Creek Canyon and base of Humphrey's Peak, Coconino County.

This form was not uncommon in the open yellow pine groves near the hotel, while in other places it was very scarce. Individuals of this species seem to be unable to fly without clattering. In the afternoons it was not on the wing.

HADROTETTIX Seudder.

Hadrotettix trifasciatus (Say).

A single male of this species, collected by H. A. Kaeber, July 6, 1907, on the plains at the mouth of Ramsay Canyon, Huachuca Mountains, has been examined.

ANCONIA Seudder.

Anconia integra Seudder.

At both Tucson and Yuma this species was encountered, five males and two females having been taken at the former locality on July 26 and twenty males and two females at the latter on July 27 and 28. In size there is an appreciable amount of variation in the male sex, the four females being quite uniform. All the females and four of the Tucson males are green; all the Yuma males and one Tucson male are hoary white or pale ochraceous more or less thickly overlaid with maculations of olive. Several of the brownish specimens are very pale and but faintly maculate, while five are strongly marked, having the pronotal decussate markings pronounced. The other brownish males are more or less intermediate between the two extreme types.

Tucson is the most eastern record for this species, the previously published Arizona records being from Phoenix and Bill William's Fork.

At Tucson this species was taken among high weeds both in damp and dry locations. They were very wary and alert and when missed flew for some considerable distance. A preference to alighting on the ground when pursued rather than on weeds and bushes was observed, though invariably first discovered among vegetation. At Yuma it was found on the greasewood covered sand flats.

HELIASTUS Saussure.

Heliastus aridus (Bruner).

This extremely variable species is represented by specimens taken at Tucson (July 26, 3 ♀), Sonora Road Canyon (July 25, 2 ♂, 1 ♀, 1 nymph), Sonora Road near Tucson Mountains (July 25, 1 ♀) and Roeble's Ranch (July 24, 1 ♂, 1 ♀). There is a great diversity in the size of the Tucson females, while the coloration is of the usual vari-

ability. The three individuals from the Sonora Road Canyon are distinctly suffused with reddish, the males very strongly so, while the Tucson and Roeble's Ranch specimens have hoary white their most conspicuous color tone. The Sonora Road specimen has as its general tint the peculiar blue gray often seen in this species.

This form was found to be a typical desert species, not noticed anywhere in numbers.

PHRYNOTETTIX Uhler.

Phrynotettix magnus (Thomas).

A pair of this species taken July 6 by H. A. Kaerber at Palmerlee and an immature male taken in Sonora Road Canyon, Tucson Mountains, July 25, have been examined.

The Palmerlee male is labelled "Found under manure." The Sonora Road Canyon specimen was found on a rocky hillside.

SCHISTOCERCA Stål.

Schistocerca vaga (Scudder).

At Tucson four males and two females of this species were collected July 26. One female is quite dark in color with strongly contrasted pattern; the other of the same sex shows little contrast and is pale dull brownish. The specimens were found among wild sunflowers and other high plants. In this situation individuals were taken with far greater ease than others previously seen on the desert.

Schistocerca venusta Scudder.

A male and two females taken at Yuma, July 27 and 28, and a male taken at Winslow, Navajo County, September 13, represent this species. The Winslow specimen is more olive and less greenish than the Yuma individuals.

At Yuma a few specimens were seen in the dry stand of arrow-wood on the banks of the Gila River. The species was very plentiful at Winslow, in tall weeds about a water tank.

CONALCÆA Scudder.

Conalœa huachuœana Rehn.

A female of this species, collected at Palmerlee July 6 by Kaerber, has been examined.

HESPEROTETTIX Scudder.

Hesperotettix festivus Scudder.

A series of twenty-two males, twelve females and one nymph represents this species. The localities are: Tucson, July 26, 1 ♂, 1 ♀; Sahuaro slope, southwest of Tucson Mountains, July 24, 1 ♂; Sonora

Road near Tucson Mountains, July 25, 13 ♂, 9 ♀, 1 nymph; Roeble's Ranch, July 25, 1 ♀; Williams, September 13, 1 ♂, 1 ♀.

In size but little variation is noticeable; the tegmina of the two Williams specimens, however, do not exceed the tips of the caudal femora. Five specimens from Sonora Road are decidedly brownish, one strongly so, while all the others are shades of green, in a few cases with a faint bluish tinge to the tegmina. Reddish pregeniculate annuli are indicated more or less strongly on the caudal femora of all but three specimens, which latter are either in or approach the brownish phase. The pale medio-longitudinal line on the pronotum is narrower in the Williams specimens than in a number of individuals from southern Arizona.

This insect was one of the few species which was invariably found on or near rabbit-weed. In the rabbit-weed tracts a number of specimens were often found in one small clump of the weed. Relying on its protective coloration the insect often sought shelter in the center of the clump, but when frightened out of its retreat flew very swiftly on almost all occasions to another bunch of the same plant.

***Eoloplus* Scudder.**

***Eoloplus tenuipennis* Scudder.**

At Tucson this species was found in weeds growing along an irrigating ditch and a series of six males and three females was taken on July 26, while at Yuma a single male was collected on July 27. While agreeing with the original description in all essential points the Tucson individuals are decidedly larger than the type. The extremes of the series measure as follows:

	♂	♀
Length of body,	17 -18.3 mm.	17 -19.3 mm.
Length of pronotum,	4 - 4.5 "	4 - 4.9 "
Length of tegmen,	15.5-19 "	15.5-17.2 "
Length of caudal femur,	9.5-10.2 "	9.8-11.2 "

In color there is an appreciable amount of variation in the depth of the bars and maculations, the specimens with the base color dull ochre having the pattern more marked, while those with the same more yellowish have the pattern weaker. The pink of the proximal two-thirds of the caudal tibiae varies greatly in depth of color, being very delicate shell pink in some specimens and solferino in others with intermediates of various shades.

This species was described from Fort Grant, Graham County, Arizona, and has since been recorded from Bill William's Fork, western Arizona.

A single female in the Academy Collection was taken at Phoenix (October 4, 1900; Kunzé).

***Æoloplus arizonensis* Scudder.**

In the vicinity of Yuma this species was not uncommon, a series of seven males, fifteen females and one nymph being taken July 27 and 28. Among the high dry weeds on the flood plain of the Gila River fourteen specimens were taken and a number of others seen; one specimen was captured on the summit of a desert hill, one in cultivated alfalfa and seven were taken at night under arc lights.

There is a perceptible amount of variation in size, the length of the tegmina being quite variable; no specimens, however, having these members shorter than the type measurements, while the greater majority have them much longer. The remarks made under *Æoloplus tenuipennis* regarding color variation apply as well to this species, though the paler specimens have the tegmina distinctly light grayish, while in one specimen the pale color on the head and pronotum is almost whitish.

This species has been recorded from Fort Whipple, Yavapai County, Arizona, and the Mohave Desert.

MELANOPLUS Stål.

***Melanoplus flabellifer* Scudder.**

A series of six males and seven females of this species was taken at Williams, September 13. All are typical of *flabellifer*, showing little or no tendency toward *occidentalis* or *cuneatus*. The coloration is quite dark, the pattern much subdued. There is some variation in the depth of the glaucous color of the caudal tibiae. This is the first record of the species from Arizona.

All of these specimens were taken in a field of low vegetation. The insects were inactive as the dew was yet on the ground. The condition of a number of the specimens shows that their season was well advanced.

***Melanoplus herbaceus flavescens* Scudder.**

Two males of this form were taken at Yuma on July 28, one on cultivated ground, the other on desert growth.

The only previous record of this form from Arizona was from Bill William's Fork, Mohave-Yuma County, specimens from Phoenix being intermediate between *herbaceus* and *flavescens*.

***Melanoplus brownii* Caudell.**

This species was abundant locally at Tucson, where a series of twelve males and nineteen females were taken on July 26. In size

there is an appreciable amount of individual variation, the extremes of the series measuring as follows:

	♂	♂	♀	♀
Length of body, . . .	18.6 mm.	21.5 mm.	24.2 mm.	28.4 mm.
Length of tegmen, . . .	18 "	20 "	20 "	24.2 "
Length of caudal femur, .	10.8 "	12.5 "	12.2 "	14.8 "

The coloration is quite uniform, only a few specimens being more richly colored than the others, the caudal femora, however, being some shade of glaucous in all the series instead of "yellowish brown" as originally described.

The female specimen recorded by Rehn as *M. canonicus*? from Florence, Arizona,¹⁰ and those of the same sex from the Huachuca range recorded by him as *M. flavidus*¹¹ are referable to this species. The absence of accompanying males was responsible for the erroneous identifications. The Florence individual has since been compared with the types of *brownii*.

The range of this species now extends from Yuma up the Gila Valley to Phoenix and Florence, southward to Tucson, the Baboquivari and Huachuca Mountains.

The species was found at Tucson, frequenting high weeds near water and cultivated areas.

Melanoplus atlanis (Riley).

A male and two females represent this widely distributed species, the localities being Williams, September 13 (♂), Tucson, July 26 (♀), and Sonora Road near Tucson Mountains, July 25 (♀). These specimens are distinctly larger than eastern individuals of the species, a fact previously noted by Rehn¹² in regard to Florence and Phoenix, Arizona, representatives. The Sonora Road specimen has the coloration strongly contrasted.

Melanoplus aridus (Seudder).

A very interesting series of this species was taken at localities in northern Arizona, a region from which it was previously not reported. Nine specimens from Williams, September 13, five males, four females, average about equal in size to individuals from Florence, Arizona, and are distinctly smaller than Seudder's measurements. Three males and one female taken at Anita, September 11, show a further reduction in size, while a series of fourteen males and eleven females from

¹⁰ *Proc. Acad. Nat. Sci. Phila.*, 1904, p. 572.

¹¹ *Ibid.*, 1907, p. 54.

¹² *Proc. Acad. Nat. Sci. Phila.*, 1907, p. 78.

the rim of the Grand Canyon at Bright Angel, September 11, are very decidedly smaller than Scudder's measurements, some specimens being hardly more than half the size given by him. The senior author recently called attention¹³ to the size variability of this species, citing Huachuca Mountain individuals larger than the original measurements.

The coloration of the Grand Canyon series shows little yellowish, having grays and gray-browns predominating, while the Anita and Williams specimens are somewhat brighter, though by no means as strikingly colored as Florence, Arizona, individuals. The yellow of the ventral surface is pure in some specimens and much soiled and washed with red brown in others.

At Williams and Anita this species was extremely common in the grassy open glades of the pine forest, while at Grand Canyon it was the most abundant species of Orthoptera and was found everywhere in the undergrowth of the heavier pine woods. It was noted to be a very swift jumper, but a series was easily taken on account of its abundance.

***Melanoplus femur-nigrum* Scudder.**

This little known species is represented by a series of two males and three females taken September 11 at the rim of the Grand Canyon at Bright Angel. Here it was taken on an open hillside heavily overgrown with a plant resembling rabbit-weed.

The only previous record of this species is the original one from San Francisco Mountains, July 30, but its range is more extensive as witnessed by a female in the Academy Collection labelled "Albuquerque, N. Mex., July 13, Osler." It is quite probable that this specimen was taken in the mountains near Albuquerque, as it is hardly likely to occur in the distinctly Sonoran vicinity of the city.

***Melanoplus femur-rubrum* (DeGeer).**

A male of this species was taken at Winslow, Navajo County, 4,848 feet elevation, September 13.

***Melanoplus canonicus* Scudder.**

A series of two males and seven females, taken September 12 along or near the Bright Angel Trail, Grand Canyon, represent this species. These specimens were taken at altitudes ranging from 4,850 to 6,800 feet, one female alone being from above an elevation of 5,800 feet. The species was found only in scattered growths of piñon and juniper, exhibiting a preference for the latter tree. Specimens were found on the ground, in bushes and clinging to the twigs of juniper.

¹³ *Proc. Acad. Nat. Sci. Phila.*, 1907, p. 51.

In size there is considerable variation in the series, all being smaller than Scudder's original measurements. The extremes of the series in hand are as follows:

	♂	♂	♀	♀
Length of body, . . .	17 mm.	20.2 mm. ¹⁴	22.5 mm.	27 mm.
Length of tegmen, . .	15 "	13.8 "	15.8 "	18.2 "
Length of caudal femur,	10.5 "	9.8 "	11.5 "	13.4 "

The distal portion of the furcula varies in the two males, being rather slender in one and comparatively thick in the other.

The majority of the specimens are strongly overcast with brownish, sometimes with a decided olivaceous tinge, only one specimen being "luteo-testaceous" as originally described.

In addition to the original record from the Grand Canyon, this species has been recorded from Bill William's Fork by Rehn and from Tucson by Snow.

DACTYLOTUM Charpentier.

Dactylotum variegatum Scudder.

A male and two females of this species, taken July 6 on the plains at the east base of the Huachuca Mountains by H. Kaeber, have been examined.

TETTIGONIDÆ.

ARETHÆA Stål.

Arethæa sellata Rehn. *

A male of this species, taken at Palmerlee, Huachuca Mountains, July 15, by H. A. Kaeber, has been examined.

SCUDDERIA Stål.

Scudderia furcifera Scudder.

This species is represented by a male taken at Palmerlee, Huachuca Mountains, July 6, by H. A. Kaeber.

MICROCENTRUM¹⁵ Scudder.

*Microcentrum rhombifolia*¹⁶ (Saussure).

A single female of this species was taken at light at Nogales, August 13, 1906, by Calvert.

¹⁴ Abnormally distended.

¹⁵ Kirby (*Synon. Catal. Orth.*, II, pp. 455, 480) has transferred this generic name to the genus usually known as *Stilpnochlora* Stål, and in its place for *Microcentrum* of authors uses *Orophus* Saussure, 1859. For the type of the latter he selects *retinervis* Burmeister (*salicifolia* Saussure), disregarding the fact that Rehn (*Proc. Acad. Nat. Sci. Phila.*, 1905, p. 808, March, 1906) some months previously had selected *mexicanus* as the type of *Orophus*. In selecting a type

GRYLLIDÆ.

NEMOBIUS Serville.

Nemobius neomexicanus Scudder.

This species was taken at light at Tucson (July 23, 1 ♀) and Yuma (July 27 and 28, 3 ♀) and was decidedly scarce wherever it was encountered. The Tucson specimen is appreciably larger than the Yuma individuals.

GRYLLUS Linnæus.

Gryllus personatus Uhler.

At Tucson this species came to light in great numbers the evenings of July 23 and 26, a series of twenty males and eighteen females being collected.

Size as usual exhibits a considerable range of variation, while several males are of a strongly megacephalic type.

As the proportions of the caudal femora and ovipositors and the measurements of the tegmina may prove of use to future workers, they are tabled below.

Proportions of caudal femur and ovipositor in eighteen females from Tucson.

Ovipositor.

<i>Caudal femur.</i>	12 mm.	12.3 mm.	12.5 mm.	13 mm.	13.2 mm.	13.5 mm.	13.8 mm.	14 mm.	14.5 mm.	15 mm.
10.7 mm.	1	.....	.....	1	.....	.....	.....	.....	.....	.....
11 "	1	.....	.....	.....	.....	.....	.....
11.3 "	1	1	1	.....	.....	.....	.....	.....	.....
11.5 "
11.7 "	1	.....	1	.....	.....	.....	.....
12 "	1	1	1	.....	.....	.....	.....	.....
12.2 "	1	1	1	1	.....
12.5 "	1	.....	.....	.....
13 "	2

for *Microcentrum* Scudder, Kirby has been confused by the synonymy of the species and selected *Steirodon thoracicus* Serville as the type, which was not included in *Microcentrum* by Scudder; the latter's *Microcentrum thoracicum* having been proposed independently, not being the same as *thoracicus* Serville or *thoracica* Burmeister. This is shown by Kirby in his arrangement of the synonymy; but in selecting his type he has overlooked it. In consequence it is necessary to select as the type of *Microcentrum* a species originally included in the genus and *affiliatum* Scudder (= *rhombifolia* Saussure) is so selected. This is in accordance with Article 30 of the Revised International Code of Nomenclature.

¹⁶ This name must be used in place of *laurifolium* of authors; *laurifolium* of Linnæus, as shown by Kirby (*Synon. Catal. Orth.*, II, p. 456), being a *Stilpnoclora*.

*Measurements of caudal femur, tegmen and ovipositor.**Females (eighteen specimens).*

<i>Caudal femur.</i>	<i>Tegmen.</i>	<i>Ovipositor.</i>
10.7 mm. (2)	13 mm. (8)	12 mm. (1)
11 " (1)	13.2 " (2)	12.3 " (1)
11.3 " (3)	13.5 " (1)	12.5 " (2)
11.5 " (1)	14 " (3)	13 " (5)
11.7 " (1)	14.2 " (2)	13.2 " (1)
12 " (3)	14.5 " (1)	13.5 " (2)
12.2 " (4)	14.8 " (1)	13.8 " (2)
12.5 " (1)		14 " (1)
13 " (2)		14.5 " (1)
		15 " (2)

Males (twenty specimens).

<i>Caudal femur.</i>	<i>Tegmen.</i>
10.5 mm. (1)	12 mm. (1)
11 " (1)	12.3 " (2)
11.2 " (2)	12.5 " (1)
11.5 " (1)	12.8 " (1)
11.7 " (6)	13 " (2)
12 " (3)	13.2 " (1)
12.2 " (1)	13.5 " (4)
12.5 " (2)	13.8 " (5)
12.7 " (1)	14 " (1)
13.8 " (2)	15 " (1)
	15.3 " (1)

The entire series of thirty-eight specimens is macropterous.

There is considerable variation in the depth of the coloration, some individuals having the head so much suffused with blackish that the usual pale occipital lines are not visible.

Gryllus armatus Seudder.

This species came to light abundantly at Yuma on the evenings of July 27 and 28, a series of nine males and forty-five females being collected. A pair were also taken at Tucson, July 26, under the same conditions. All the specimens collected are macropterous.

To assist future workers in this difficult genus measurements taken from the Yuma series are here given.

<i>Length of tegmen.</i>	<i>Length of caudal femur.</i>	<i>Length of ovipositor.</i>
10 mm. (1)	9.6 mm. (1)	11.6 mm. (1)
11.2 " (1)	10 " (2)	11.8 " (1)
11.6 " (2)	10.2 " (3)	12 " (4)
11.8 " (3)	10.4 " (2)	12.2 " (3)
12 " (5)	10.6 " (7)	12.6 " (3)
12.2 " (3)	10.8 " (2)	12.8 " (7)
12.4 " (5)	11 " (15)	13 " (6)
12.6 " (6)	11.2 " (8)	13.2 " (6)
12.8 " (5)	11.4 " (5)	13.4 " (3)
13 " (7)	11.6 " (3)	13.6 " (4)
13.2 " (3)	11.8 " (4)	13.8 " (2)
13.4 " (4)	12 " (3)	14 " (3)
13.6 " (6)	12.2 " (1)	14.4 " (2)
13.8 " (3)		Broken in one
14 " (1)		specimen.

Proportions of caudal femur and ovipositor in forty-five Yuma females.

Ovipositor.

<i>Caudal femur.</i>	11.6 mm.	11.8 mm.	12 mm.	12.2 mm.	12.4 mm.	12.6 mm.	12.8 mm.	13 mm.	13.2 mm.	13.4 mm.	13.6 mm.	13.8 mm.	14 mm.	14.2 mm.	14.4 mm.
10 mm.	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10.2 "	1	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
10.4 "	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
10.6 "	1	1	1	.....	1	.....	.....	.....	.....	.....
10.8 "	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11 "	1	1	.....	.....	5	3	1	.....	.....	1	1	.....	.....
11.2 "	1	2	.....	3	.....	.....	.....	1
11.4 "	1	1	.....	1	.....	1	.....	.....
11.6 "	1	.....	1	.....	.....	.....	.....
11.8 "	1	.....	.....	1	.....	.....	1	.....	.....	.....
12 "	1	.....	1	.....	1

While the head is blackish in all the specimens, the pronotum is frequently quite reddish, in some individuals entirely so, which latter type is connected with that having the pronotum solid blackish by a considerable number of intermediates.

It was astonishing to note the numbers in which this species came to the arc lights, hundreds of them running about on the ground beneath the lights or flying swiftly around in circles.

MIOGRYLLUS Saussure.

Miogryllus pictus Scudder.

At Yuma on the evenings of July 27 and 28 this species frequented the vicinity of the electric lights in considerable numbers. A series of

fourteen males and sixteen adult and one immature female was taken. There is an appreciable but not very great variation in the size of individuals of this species, while the coloration varies only in the suffusion of the pronotal markings; some specimens having them distinct and others having them clouded with a wash of the darker color. The males without exception have the pronotum dark and the pattern not apparent.

This species was more agile than *Gryllus armatus*, with which it was associated.

ECANTHUS Serville.

Ecanthus niveus (DeGeer).

A single male of this species was taken near Bright Angel Trail, Grand Canyon, at an elevation of about 4,900 feet, September 12. It was taken from a weed resembling rabbit-weed in the piñon zone.

Ecanthus nigricornis Walker.

A single male from the rim of the Grand Canyon at Bright Angel, September 11, is referred tentatively to this species. The antennal markings are not as complex as usual in the species, but the proportions and general coloration are nearly typical. The individual was captured stridulating at night on the species of weed referred to under *E. niveus*.

Ecanthus quadripunctatus Beutenmüller.

Four specimens taken at Tucson, July 23-26, are referred to this species, one male, a female, attracted to light, and two immature individuals.